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Dated 19 May 2003

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03SEP02 E745081 D01/70
P01/7700 0.00-0220284.4

1/77

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
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1.	Your reference	P3406.A4/RAM
2.	Patent application number *(The Patent Office will ...)*	0220284.4 31 AUG 2002
3.	Full name or of each applicant *(underline all surnames)*	Visteon Global Technologies, Inc. Suite 728, Parklane Towers East One Parklane Boulevard Dearborn, MI 48126-2490
	Patents ADP number *(if you know it)*	United States of America 7946307001
	If the applicant is a corporate body, give the country/state of its incorporation	United States of America, State of Michigan
4.	Title of the invention	Over-Ride of Driver Demand in a Motor Vehicle
5.	Name of your agent *(if you have one)*	DUMMETT COPP
	"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*	25 THE SQUARE MARTLESHAM HEATH IPSWICH IP5 3SL
	Patents ADP number *(if you know it)*	6379001

6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number	Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7.	If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application	Date of filing *(day / month / year)*

8.	Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:* *a) any applicant named in part 3 is not an inventor, or* *b) there is an inventor who is not named as an applicant, or* *c) any named applicant is a corporate body.* *See note (d))*	YES

Over-ride of Driver Demand in a Motor Vehicle

The present invention relates to the over-ride of driver demand in a motor vehicle, when the driver activates at the same time both the brake pedal and the accelerator pedal.

A motor vehicle driver controls the speed of a conventional vehicle using foot pedals, which in a vehicle with an automatic transmission are the accelerator pedal and brake pedal, and in a vehicle with a manual transmission also the clutch pedal. Drivers will normally use the same foot to control both the accelerator pedal and the brake pedal.

However, some drivers of vehicles having an automatic transmission use two feet, one to control the accelerator pedal, and the other to control the brake pedal. This can result in simultaneous activation of both the vehicle brake and accelerator, which can result in brake overheating or undue wear, and well as causing a potential safety problem owing to constant activation of the brake lights when the vehicle is not slowing down. As a result it has been proposed to monitor the brake and accelerator pedals to detect simultaneous operation of both these pedals and to reduce or cut the driver demand to the engine when simultaneous operation has been detected.

The inventors of the present application have realised, however, that there are times when the driver may be activating both pedals at the same time in such a way that would not give rise to the aforementioned problems of brake wear or brake light safety. For example, there is a style of sporty driving for manual transmission vehicles called

and the braking demand signal have risen above predetermined levels of driver engine demand and driver braking demand.

Also according to the invention, there is provided a method of controlling the engine of a motor vehicle, the vehicle comprising an engine control unit, a driver accelerator control and a driver braking control, the method comprising the steps of:

i) using the driver accelerator control to provide to the engine control unit a driver demand signal that indicates the level of driver engine demand;

ii) using the driver braking control to provide to the engine control unit a braking demand signal that indicates the level of driver braking demand;

iii) using the engine control unit to monitor both the driver demand signal and the driver braking demand signal;

iv) using the engine control unit to over-ride the driver demand signal to reduce engine power if, after a first predetermined delay, both the driver demand signal and the braking demand signal have risen above a first predetermined level of driver engine demand and a first predetermined level of driver braking demand.

The first predetermined delay allows both the driver demand signal and the braking demand signal to rise above the respective predetermined levels for a time within the first predetermined delay. Therefore, a driver may activate both the brake and accelerator together at least during this delay

the first predetermined delay then being the later of the first delay and the second delay.

The first predetermined delay is then the longer acting of the first delay and the second delay in any particular circumstance.

It has been found that if the first delay is between 0.5 s and 1.5 s, then heel-toe driving is then possible. Similarly the second delay may be between 0.5 s and 1.5 s. In addition, if a driver rests a foot on the accelerator pedal while braking, the driver demand is not immediately restricted, but will be after the first predetermined delay has passed.

Also in a preferred embodiment of the invention, in step iv) the over-ride of the driver demand signal continues at least until both the driver demand signal and the braking demand signal have fallen below a second predetermined level of driver engine demand and a second predetermined level of driver braking demand.

It is also helpful in step iv) of the method, if the over-ride of the driver demand signal continues for a second predetermined delay after both the driver demand signal and the braking demand signal have fallen below said second predetermined levels. The second predetermined delay is preferably less than the first predetermined delay, so that the vehicle actual driver demand returns quickly to the level required by the driver. The second delay can be useful in allowing a smooth transition between the over-ride of the driver demand and the return to the driver demand required by

quickly to the engine demand required by the driver. Preferably, the third delay is between 0.1 s and 0.5 s. Similarly, the fourth delay is between 0.1 s and 0.5 s.

The invention will be further described, by way of example only, and with reference to the accompanying drawings, in which:

Figure 1 is a schematic diagram of a control system according to the invention for a motor vehicle with an internal combustion engine, having an engine control unit (ECU) that receives as inputs a driver demand signal and a braking demand signal, and which uses these signals to control engine power via electronic fuel injectors and an electronic throttle; and

Figures 2 and 3 show plots of the driver demand signal and braking demand signal, and how these can be processed according to the invention using the engine control unit of Figure 1 to create a modified driver demand signal if, after a predetermined delay, both the driver demand signal and the braking demand signal have risen above predetermined levels.

Figure 1 shows schematically a motor vehicle 1 having a control system 2 for controlling the power of an internal combustion engine 4 when an accelerator pedal 6 and a brake pedal 8 are activated at the same time by a driver.

The engine 2 has four cylinders 10 each of which is supplied with fuel 12 from a fuel injector 14 and with air 16 via an inlet manifold 20. If the engine 4 is a gasoline engine, then

However, by the time t_8 at which the over-ride logical value 46 has returned to zero, the driver demand signal 124 has already returned to zero, and so the modified driver demand 47 remains at zero following time t_8.

Figure 3 shows schematically another example in which a driver demand signal (DDS) 224 and a braking demand signal (BDS) 225 overlap in time. Features which are the same as those of Figure 2 are indicated with same symbols and reference numerals and features that correspond with those of Figure 2 are indicated by reference numerals incremented by 100.

The example of Figure 3 is the same conceptually as that of Figure 2, except that here the ECU 22 monitors the driver demand signal 224 with respect to respective thresholds (T_{DD} and T_{BB}) 50,51. The sustained driver demand (SDD) 141 therefore does not rise from a logical zero to a logical one until after the first time delay (Δt_1) 40 starting at a time t_9 following the rise of the driver demand signal 224 above the driver demand threshold 50. Similarly, the sustained braking demand (SBD) 143 does not rise from a logical zero to a logical one until after the second time delay (Δt_2) 42 starting at a time t_{10} following the rise of the driver braking signal 224 above the braking demand threshold 51.

The ECU 22 also notes when the driver demand signal 224 and the braking demand signal 225 return below the respective thresholds 50,51 at, respectively, times t_{11} and t_{12}. Again, the ECU 22 times the respective third and fourth delays 44,45 (Δt_3 and Δt_4) following times t_{11} and t_{12} after which the

Claims

1. A control system for a motor vehicle, comprising an engine, an engine control unit for controlling the engine, a driver accelerator control and a driver braking control, said controls providing to the engine control unit respectively a driver demand signal and a braking demand signal that indicate respectively the level of driver engine demand and the level of driver braking demand, the engine control unit being arranged to over-ride the driver demand signal to reduce engine power if, after a predetermined delay, both the driver demand signal and the braking demand signal have risen above predetermined levels of driver engine demand and driver braking demand.

2. A method of controlling the engine of a motor vehicle, the vehicle comprising an engine control unit, a driver accelerator control and a driver braking control, the method comprising the steps of:

i) using the driver accelerator control to provide to the engine control unit a driver demand signal that indicates the level of driver engine demand;

ii) using the driver braking control to provide to the engine control unit a braking demand signal that indicates the level of driver braking demand;

iii) using the engine control unit to monitor both the driver demand signal and the driver braking demand signal;

iv) using the engine control unit to over-ride the driver

viii) calculating a fourth delay following the time at which the braking demand signal indicates a level of driver braking demand below said second predetermined level of driver braking demand;

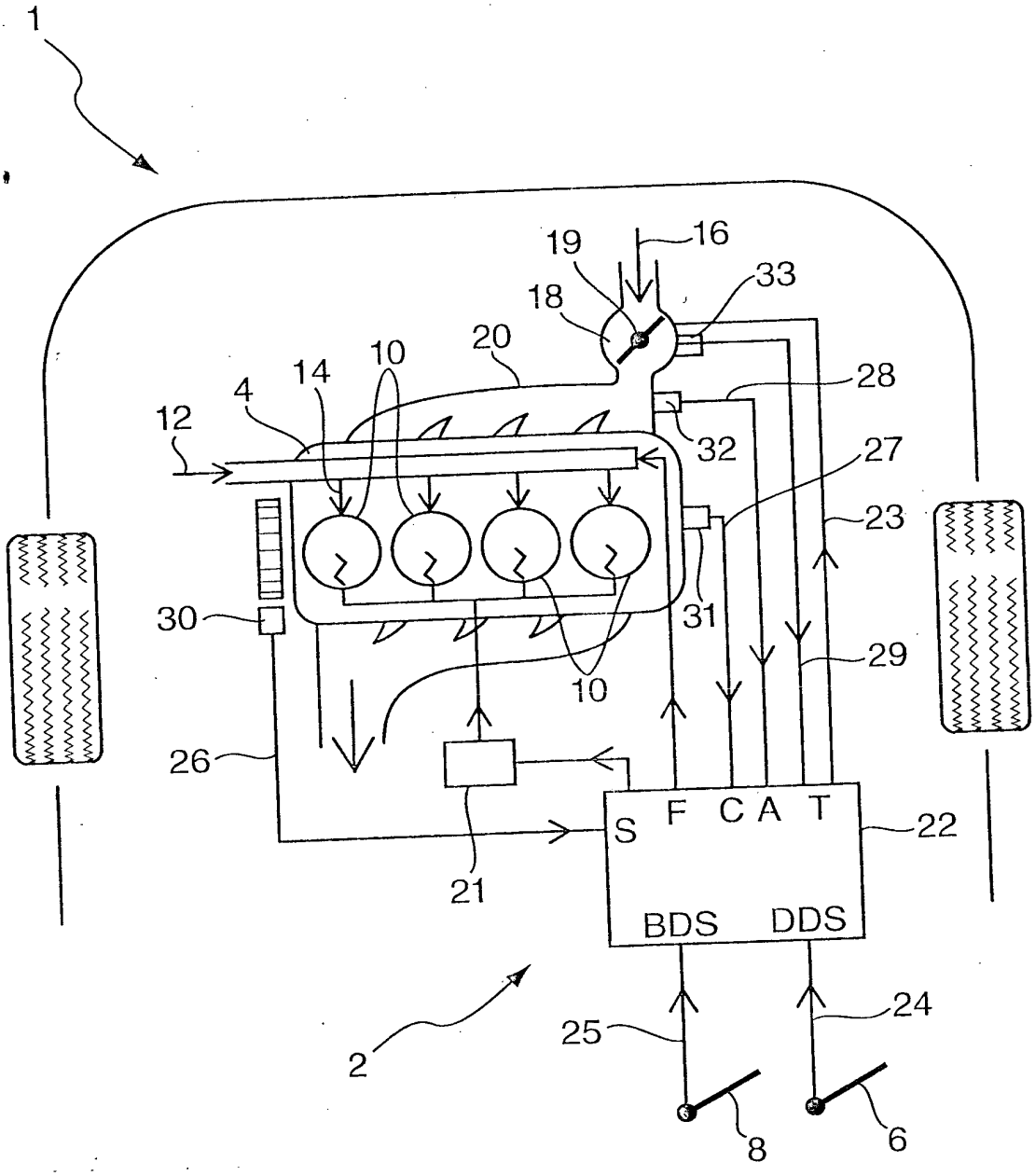
the second predetermined delay then being the later of the third delay and the fourth delay.

13. A method as claimed in Claim 12, in which the third delay is between 0.1 s and 0.5 s.

14. A method as claimed in Claim 12 or Claim 13, in which the fourth delay is between 0.1 s and 0.5 s.

15. A control system for a motor vehicle, substantially as herein described, with reference to or as shown in the accompanying drawings.

16. A method of controlling the engine of a motor vehicle, substantially as herein described, with reference to or as shown in the accompanying drawings.


1
19
16
33
18
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10
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4
12
28
32
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23
31
30
29
10
26
S
F
C
A
T
22
21
BDS
DDS
2
25
24
8
6

FIG. 1

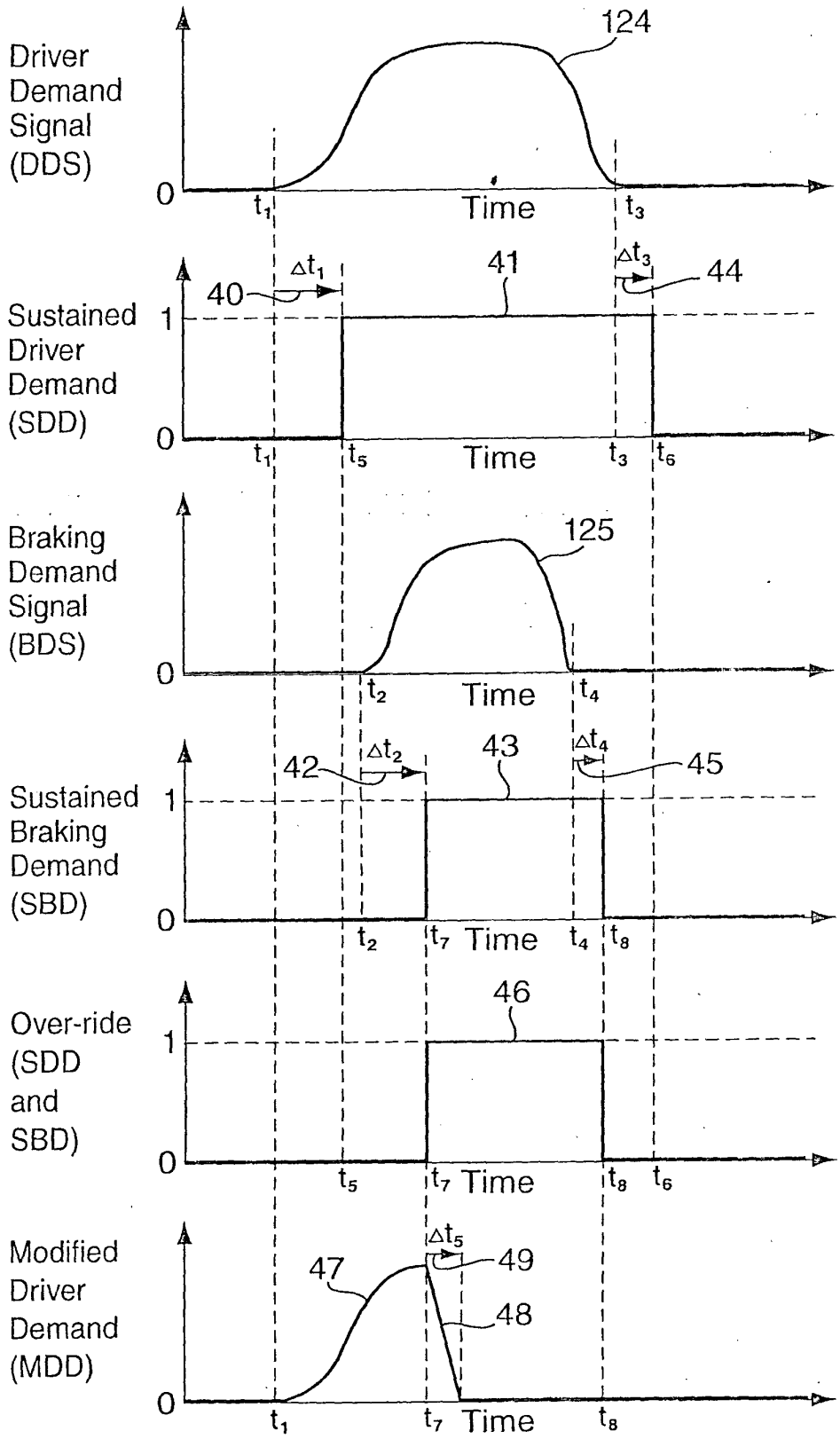
Driver Demand Signal (DDS)
124
0
t_1
Time
t_3
Sustained Driver Demand (SDD)
40
Δt_1
41
Δt_3
44
1
0
t_1
t_5
Time
t_3
t_6
Braking Demand Signal (BDS)
125
0
t_2
Time
t_4
Sustained Braking Demand (SBD)
42
Δt_2
43
Δt_4
45
1
0
t_2
t_7 Time
t_4
t_8
Over-ride (SDD and SBD)
46
1
0
t_5
t_7 Time
t_8
t_6
Modified Driver Demand (MDD)
Δt_5
47
49
48
0
t_1
t_7 Time
t_8

FIG. 2

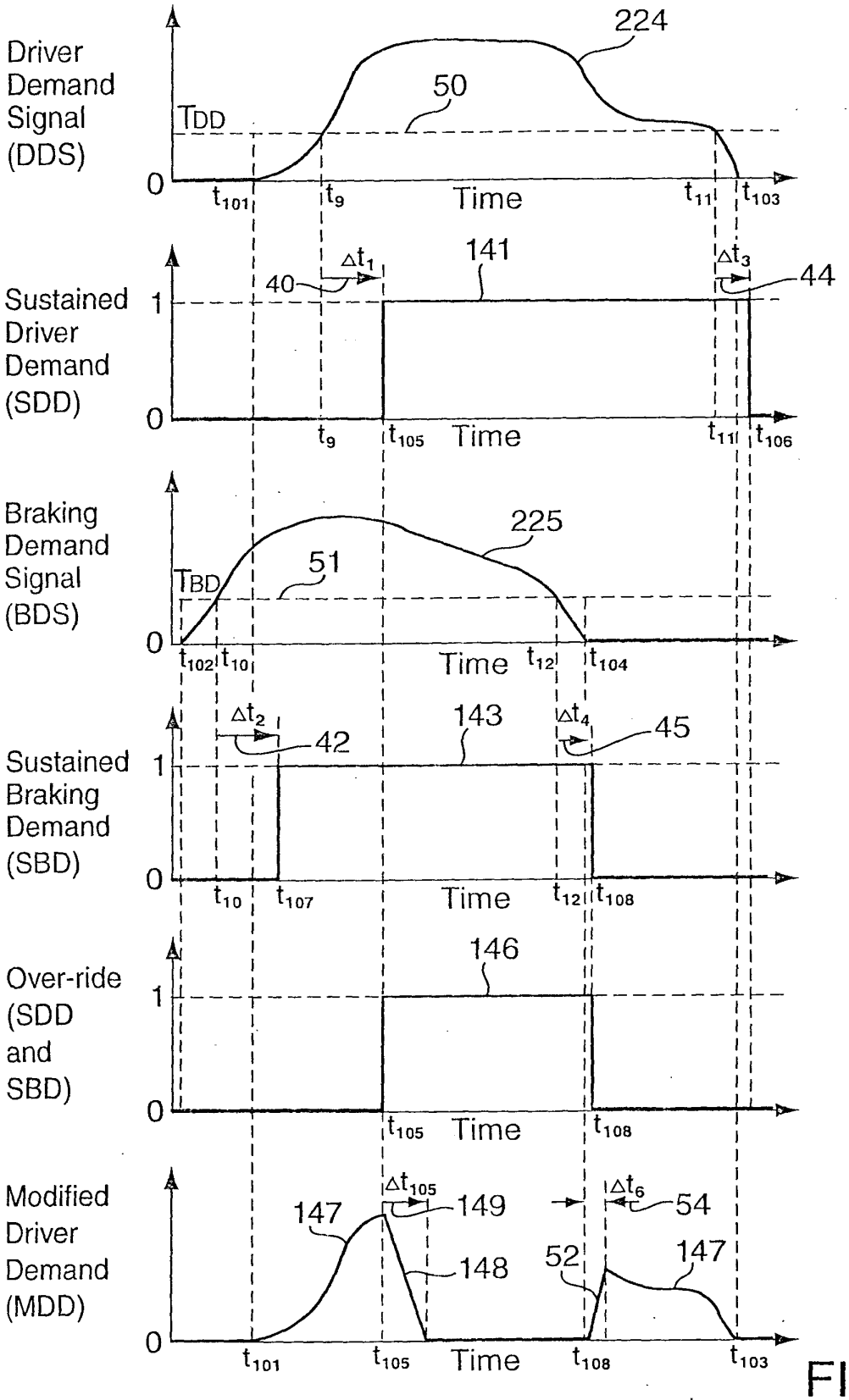
Driver Demand Signal (DDS)
224
50
TDD
0
t101
t9
Time
t11
t103
Sustained Driver Demand (SDD)
Δt1
141
Δt3
40
44
1
0
t9
t105
Time
t11
t106
Braking Demand Signal (BDS)
225
51
TBD
0
t102
t10
Time
t12
t104
Sustained Braking Demand (SBD)
Δt2
143
Δt4
42
45
1
0
t10
t107
Time
t12
t108
Over-ride (SDD and SBD)
146
1
0
t105
Time
t108
Modified Driver Demand (MDD)
Δt105
Δt6
147
149
54
148
52
147
0
t101
t105
Time
t108
t103

FIG. 3